FIG. 1
PRIOR ART

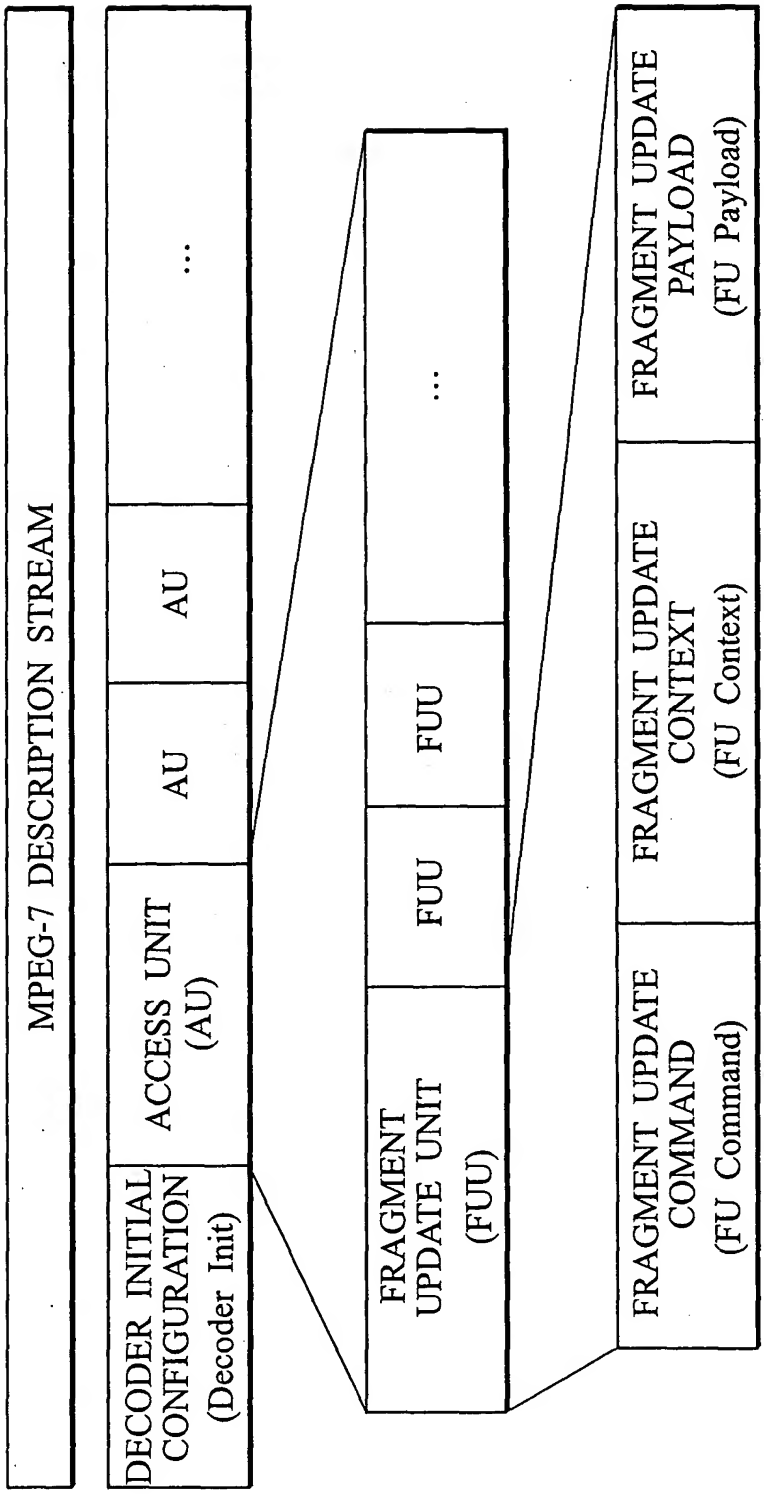


FIG. 2
PRIOR ART

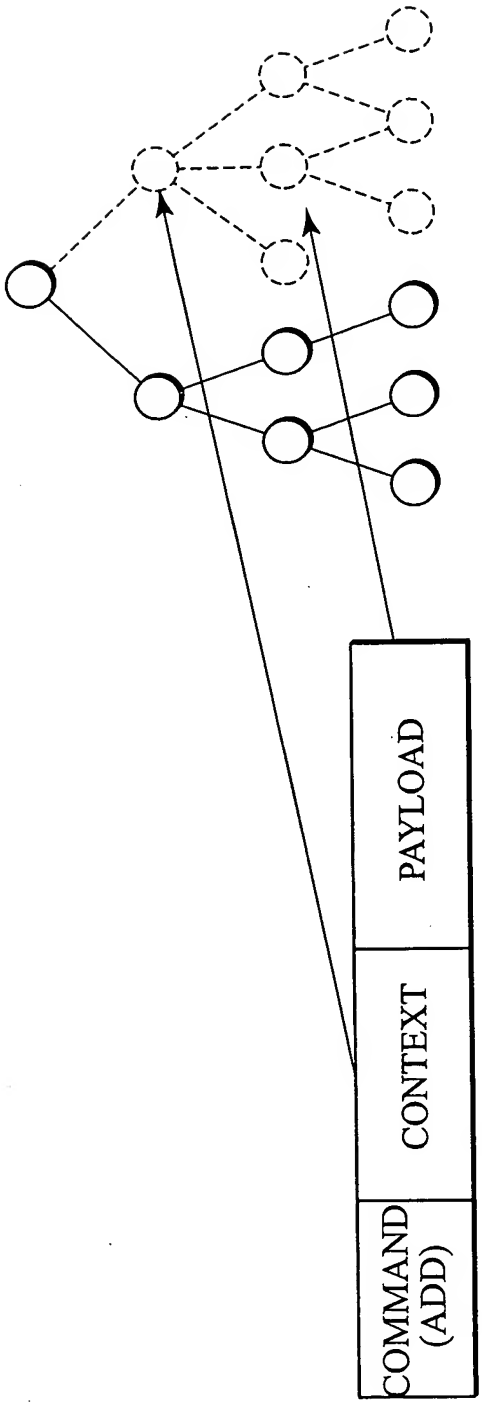


FIG. 3

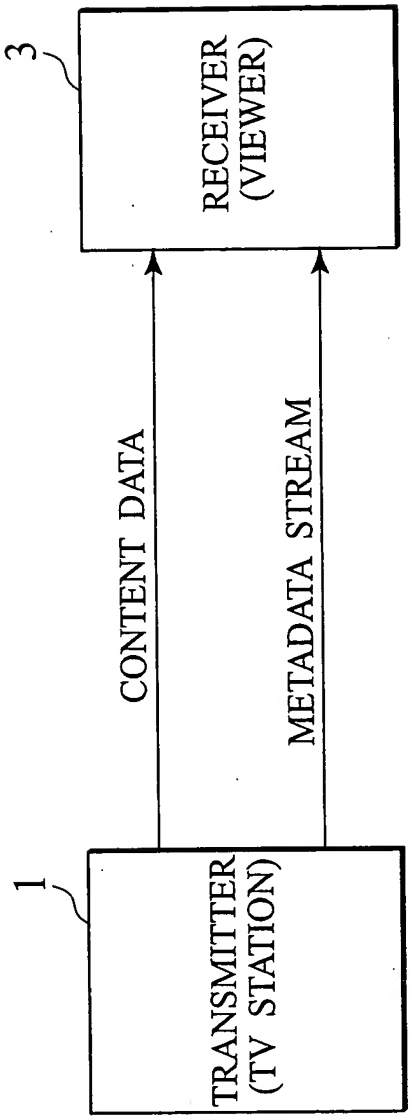


FIG. 4

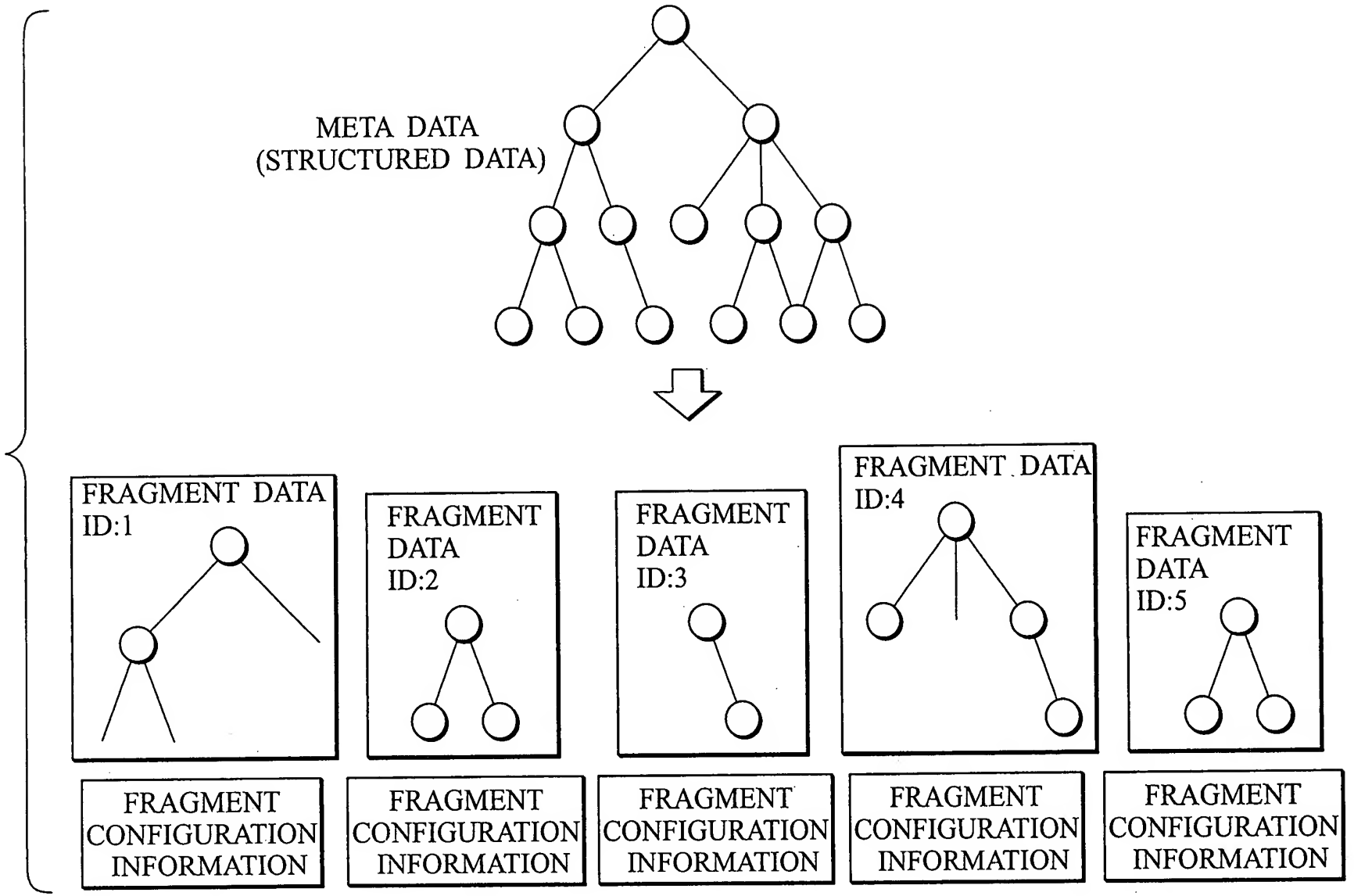

META DATA
(STRUCTURED DATA)
FRAGMENT DATA
ID:1
FRAGMENT
DATA
ID:2
FRAGMENT
DATA
ID:3
FRAGMENT DATA
ID:4
FRAGMENT
DATA
ID:5
FRAGMENT
CONFIGURATION
INFORMATION
FRAGMENT
CONFIGURATION
INFORMATION
FRAGMENT
CONFIGURATION
INFORMATION
FRAGMENT
CONFIGURATION
INFORMATION
FRAGMENT
CONFIGURATION
INFORMATION

FIG. 5

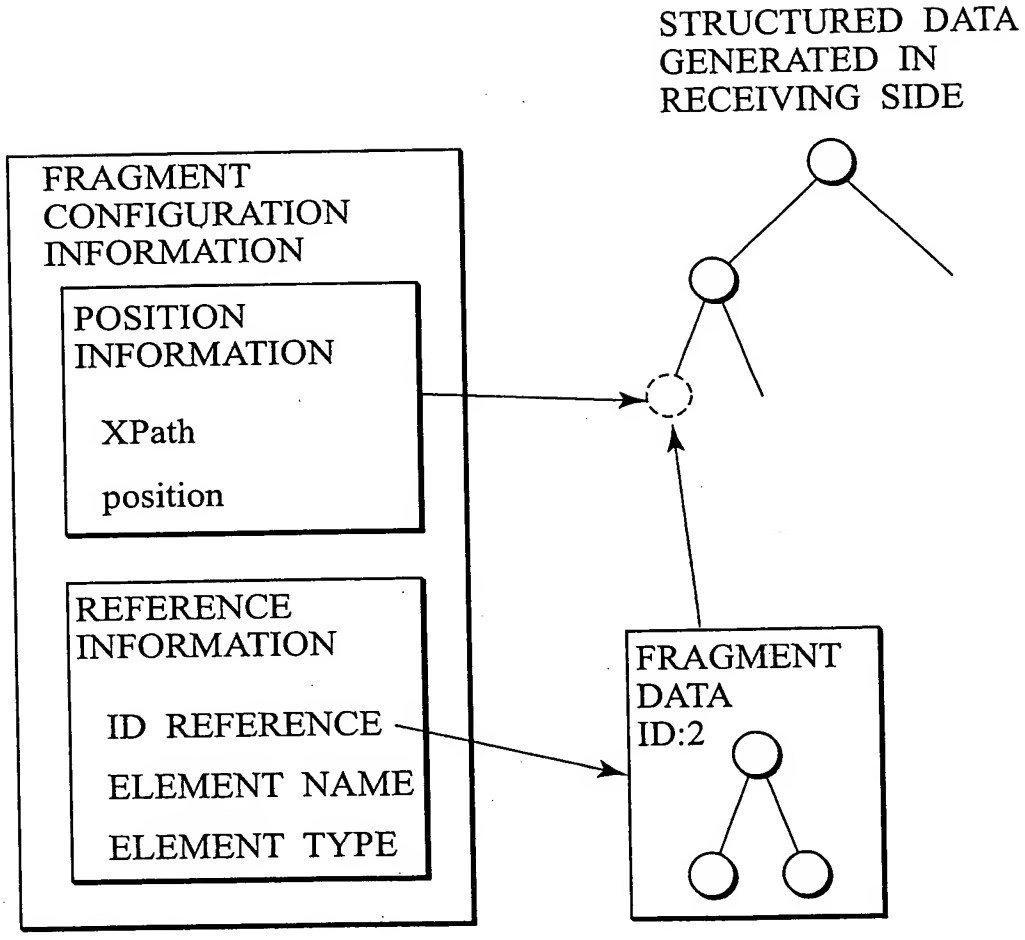
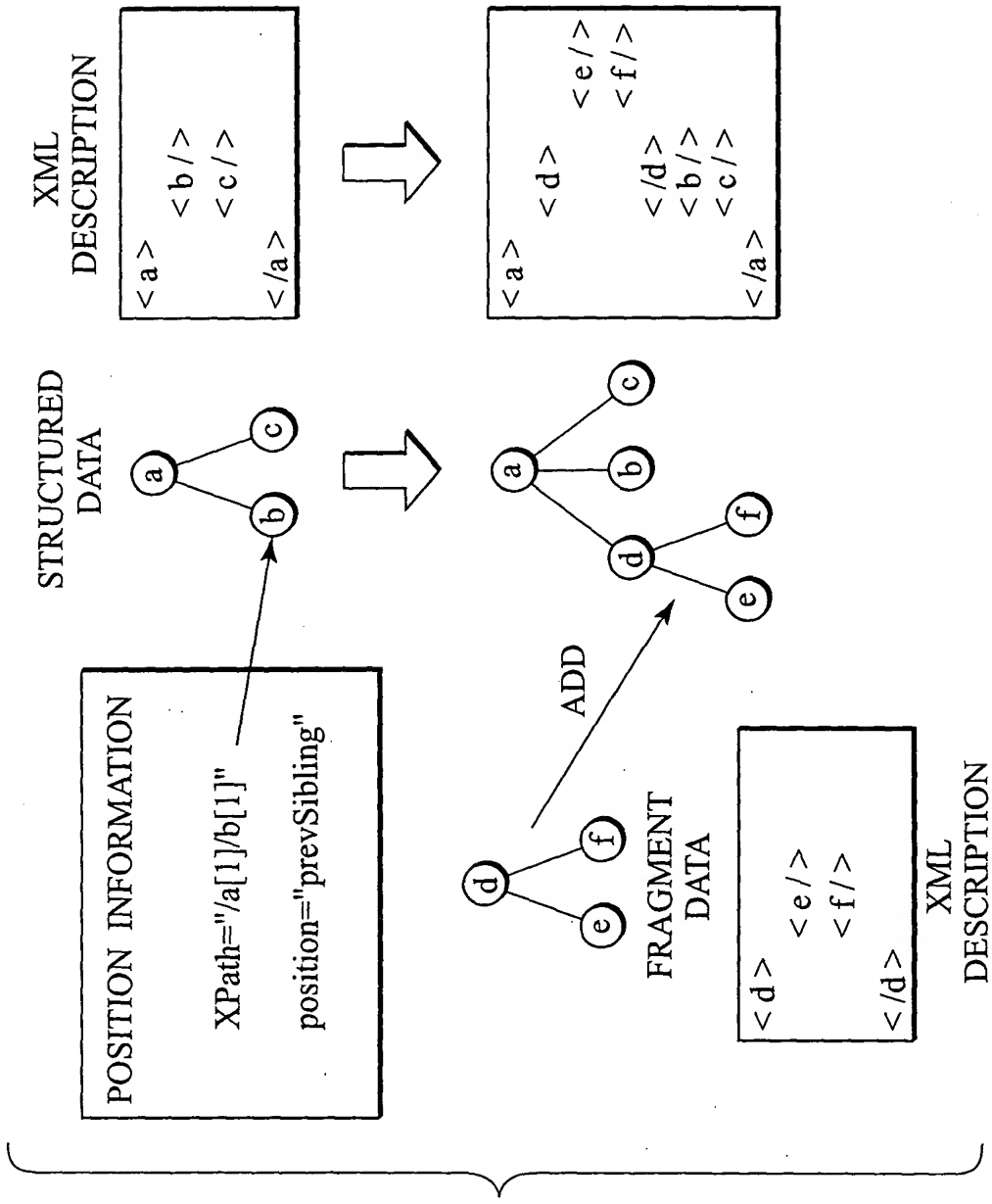

STRUCTURED DATA GENERATED IN RECEIVING SIDE
FRAGMENT CONFIGURATION INFORMATION
POSITION INFORMATION
XPath
position
REFERENCE INFORMATION
ID REFERENCE
ELEMENT NAME
ELEMENT TYPE
FRAGMENT DATA ID:2

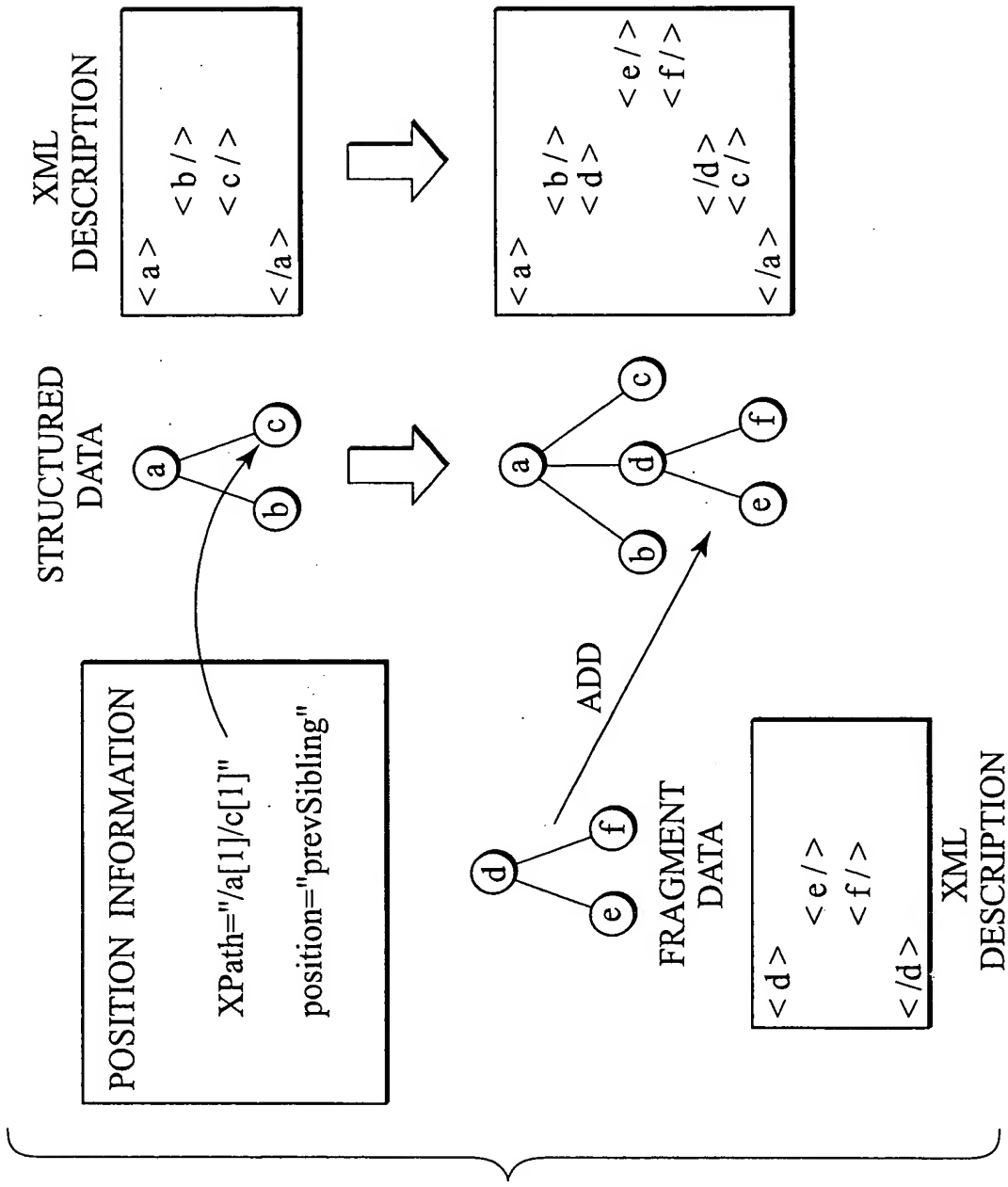
FIG. 6


XML
DESCRIPTION
<a>
<b/>
<c/>

<a>
<d>
<e/>
<f/>
</d>
<b/>
<c/>

STRUCTURED
DATA
a
b
c
a
b
c
d
e
f
ADD
POSITION INFORMATION
XPath="/a[1]/b[1]"
position="prevSibling"
d
e
f
FRAGMENT
DATA
<d>
<e/>
<f/>
</d>
XML
DESCRIPTION

FIG. 7


XML DESCRIPTION
<a>
<b/>
<c/>

STRUCTURED DATA
a
b
c
POSITION INFORMATION
XPath="/a[1]/c[1]"
position="prevSibling"
ADD
d
e
f
FRAGMENT DATA
<d>
<e/>
<f/>
</d>
XML DESCRIPTION
<a>
<b/>
<d>
<e/>
<f/>
</d>
<c/>

FIG. 8

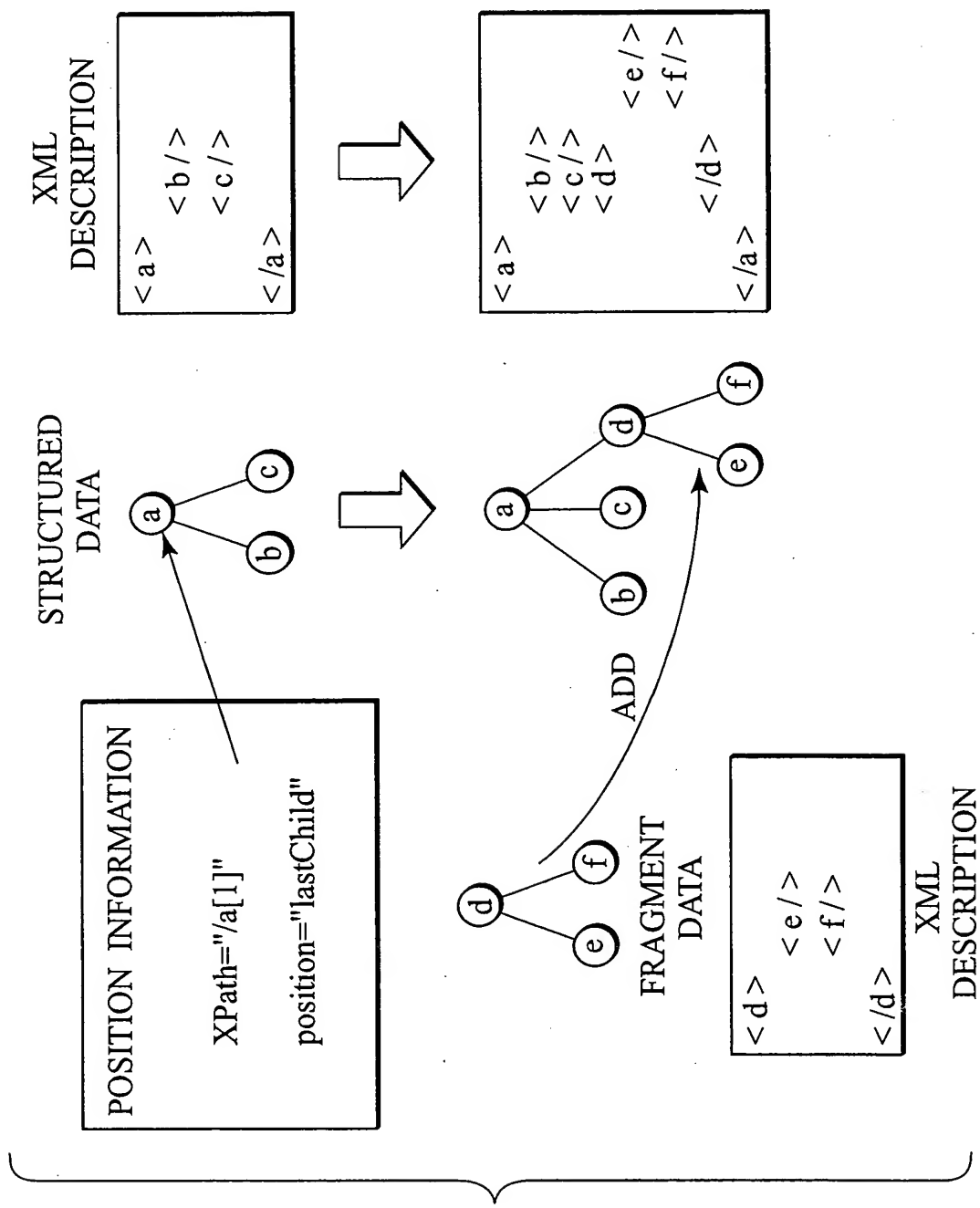
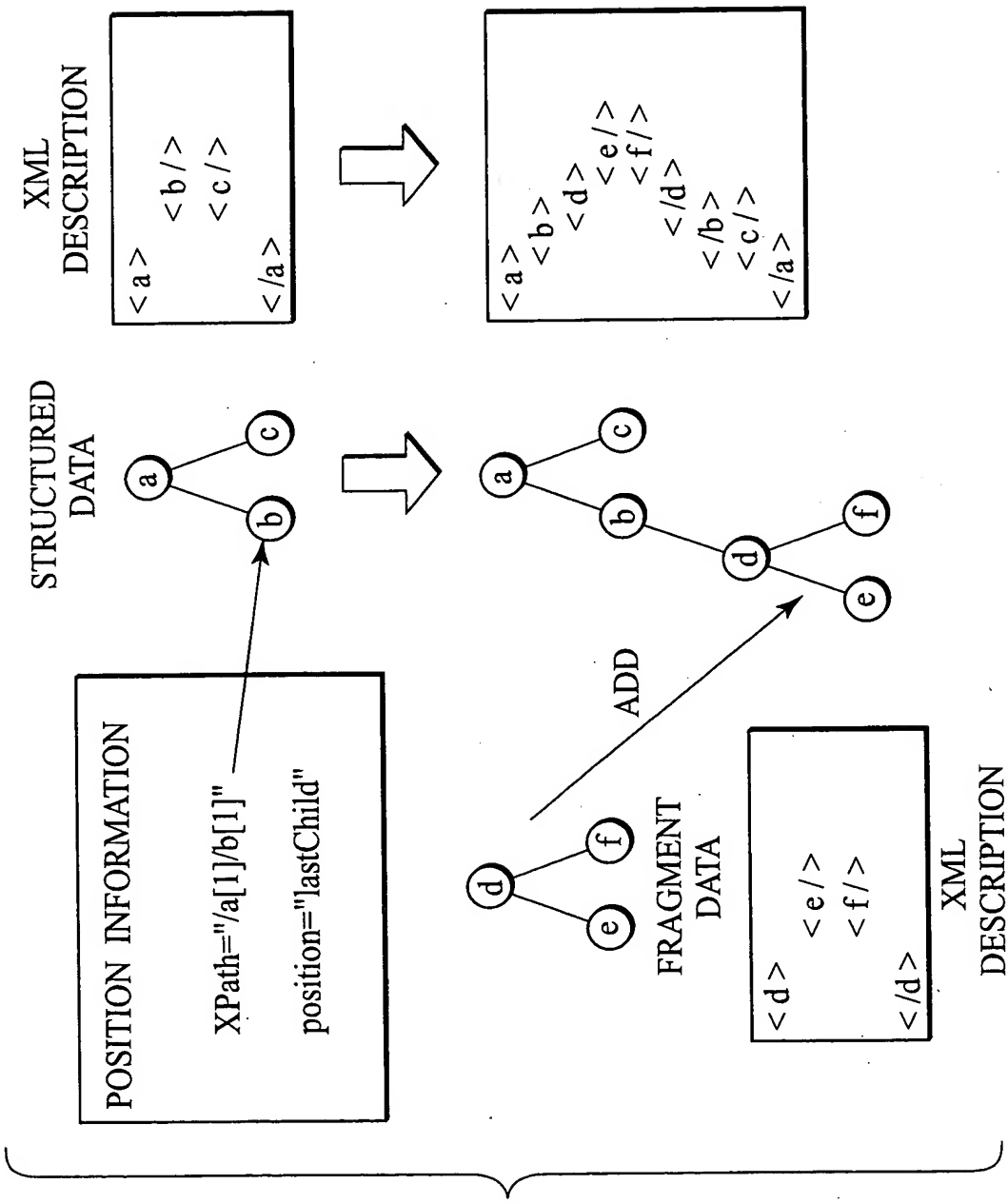

XML
DESCRIPTION
< a >
< b / >
< c / >
< /a >
STRUCTURED
DATA
a
b
c
< a >
< b / >
< c / >
< d >
< e / >
< f / >
< /d >
< /a >
POSITION INFORMATION
XPath="/a[1]"
position="lastChild"
ADD
d
e
f
FRAGMENT
DATA
< d >
< e / >
< f / >
< /d >
XML
DESCRIPTION

FIG. 9


XML
DESCRIPTION
<a>

<c/>

<a>

<d>
<e/>
<f/>
</d>

<c/>

STRUCTURED
DATA
a
b
c
POSITION INFORMATION
XPath="/a[1]/b[1]"
position="lastChild"
ADD
d
e
f
FRAGMENT
DATA
<d>
<e/>
<f/>
</d>
XML
DESCRIPTION

FIG. 10

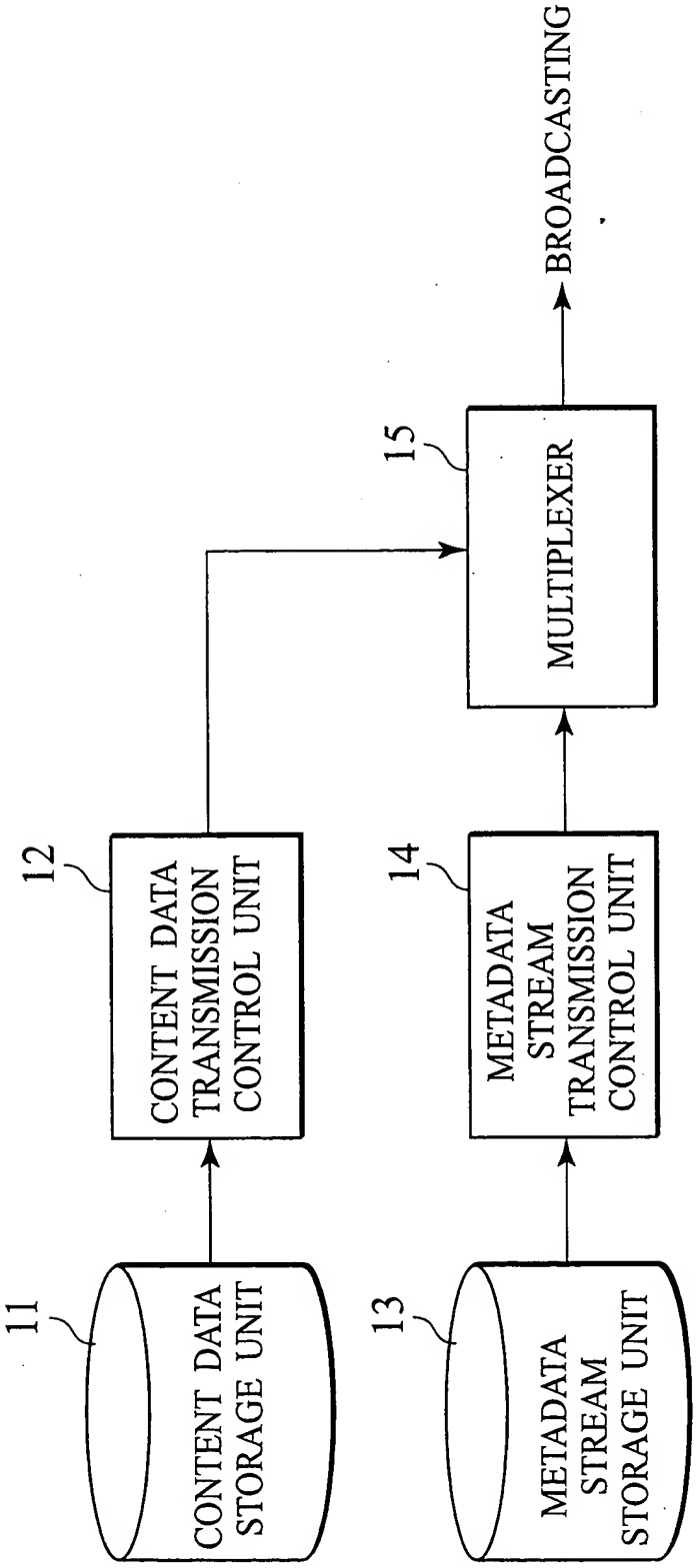

11
CONTENT DATA STORAGE UNIT
12
CONTENT DATA TRANSMISSION CONTROL UNIT
13
METADATA STREAM STORAGE UNIT
14
METADATA STREAM TRANSMISSION CONTROL UNIT
15
MULTIPLEXER
BROADCASTING

FIG. 11

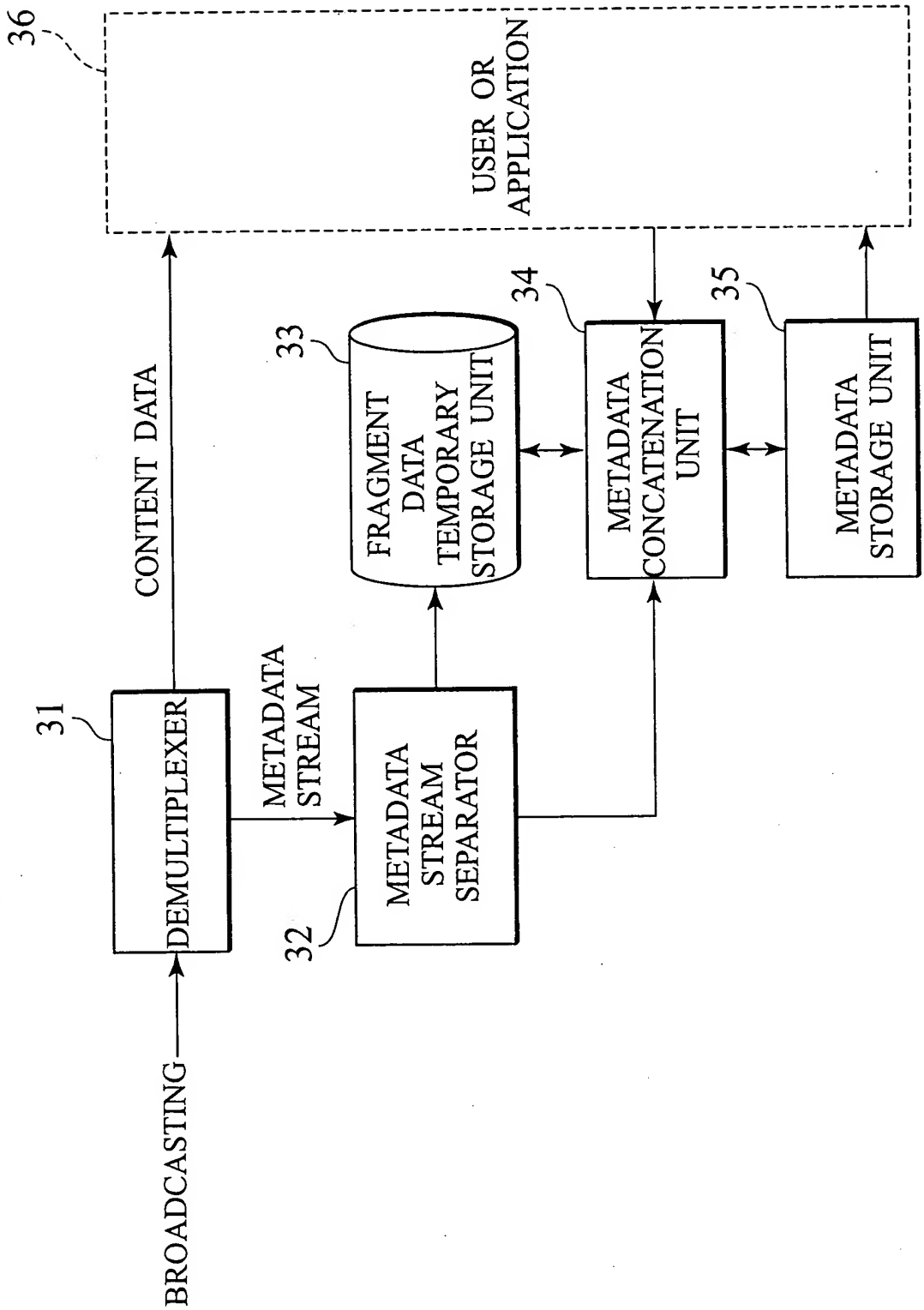

36
USER OR APPLICATION
CONTENT DATA
33
FRAGMENT DATA TEMPORARY STORAGE UNIT
34
METADATA CONCATENATION UNIT
35
METADATA STORAGE UNIT
31
DEMULTIPLEXER
METADATA STREAM
METADATA STREAM SEPARATOR
32
BROADCASTING

FIG. 12

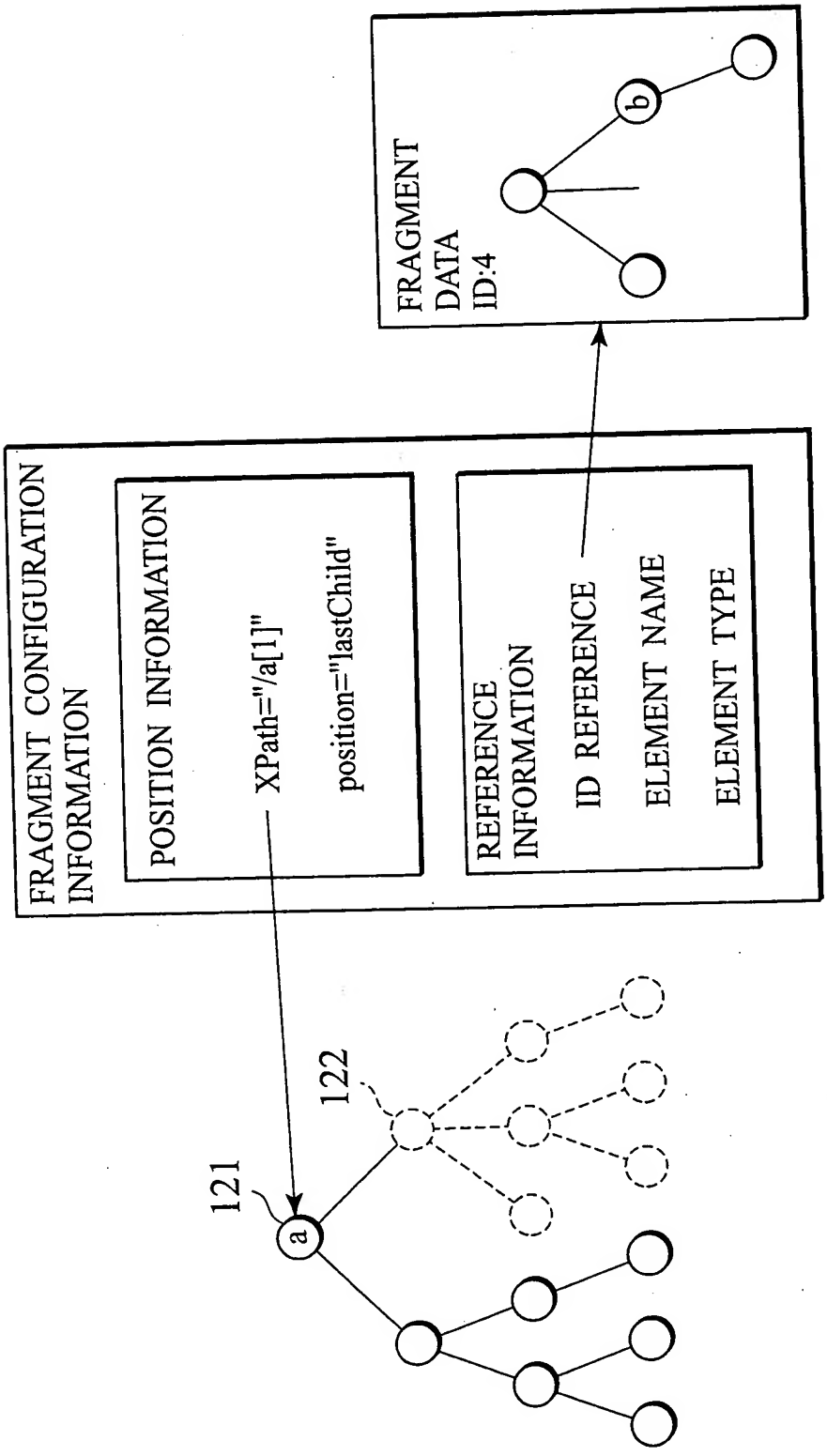

FRAGMENT CONFIGURATION INFORMATION
POSITION INFORMATION
XPath="/a[1]"
position="lastChild"
REFERENCE INFORMATION
ID REFERENCE
ELEMENT NAME
ELEMENT TYPE
FRAGMENT DATA ID:4
a
b
121
122

FIG. 13

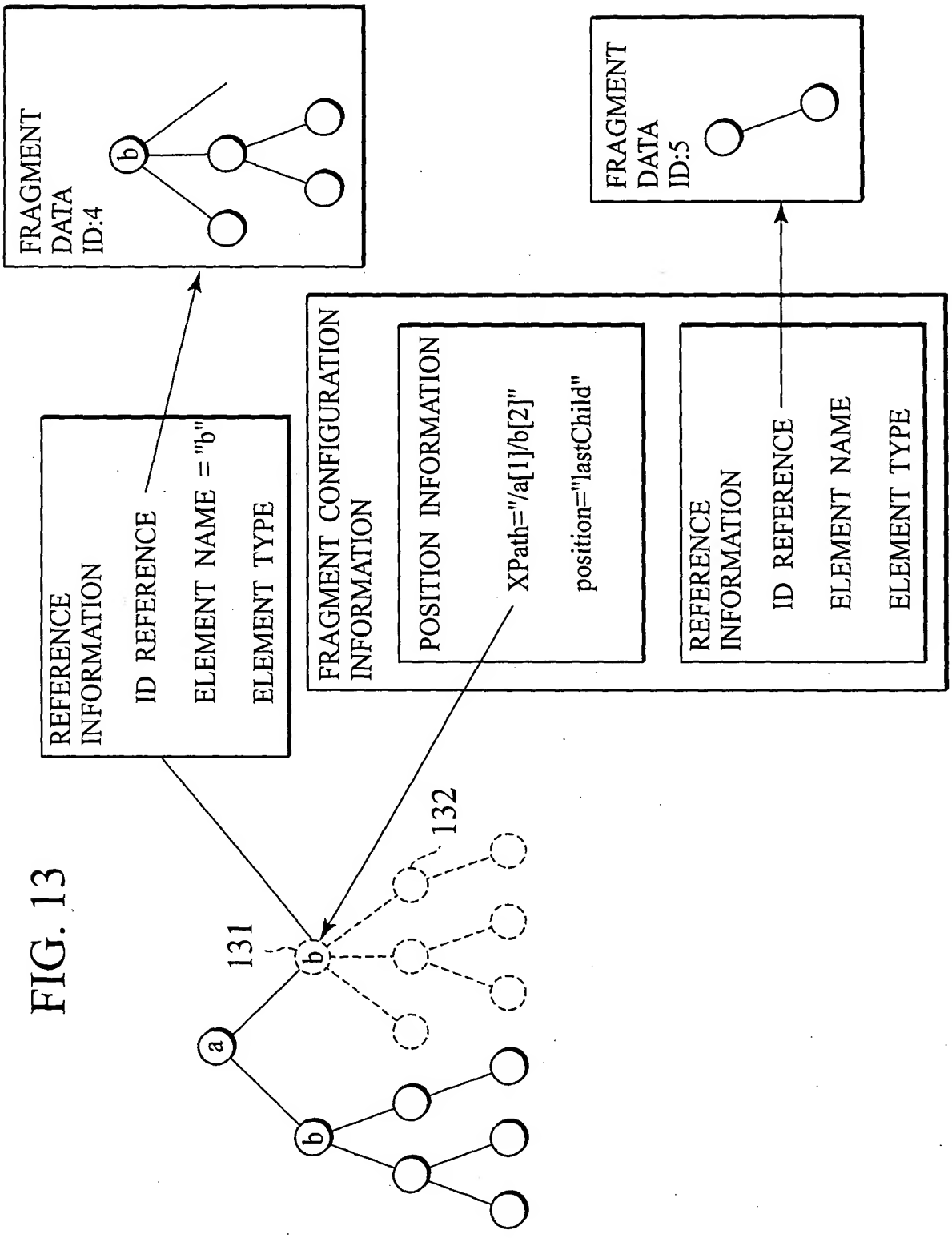

FRAGMENT
DATA
ID:4
FRAGMENT
DATA
ID:5
REFERENCE
INFORMATION
ID REFERENCE
ELEMENT NAME = "b"
ELEMENT TYPE
FRAGMENT CONFIGURATION
INFORMATION
POSITION INFORMATION
XPath="/a[1]/b[2]"
position="lastChild"
REFERENCE
INFORMATION
ID REFERENCE
ELEMENT NAME
ELEMENT TYPE
131
132
a
b
b
b

FIG. 14

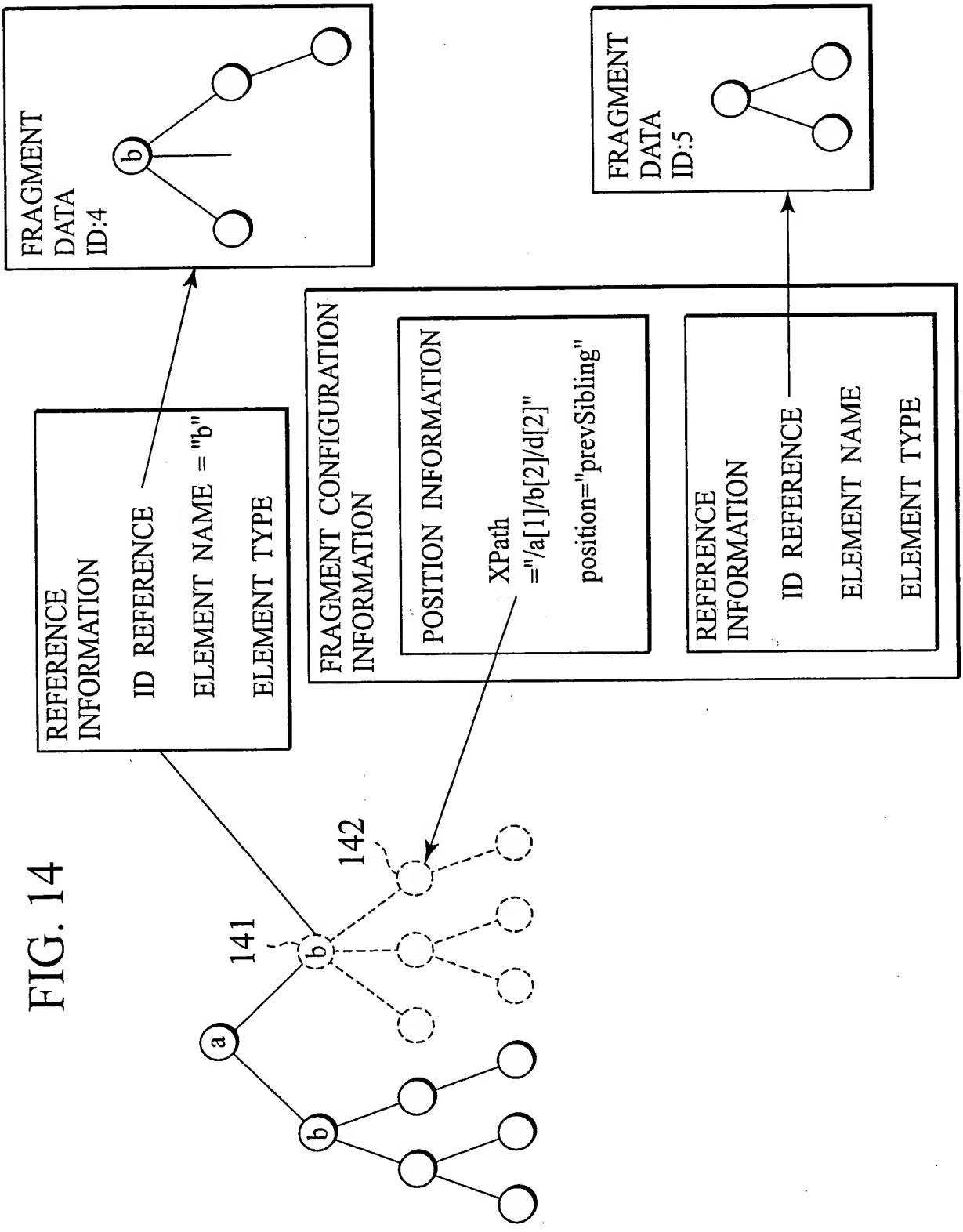

FRAGMENT DATA ID:4
FRAGMENT DATA ID:5
REFERENCE INFORMATION
ID REFERENCE
ELEMENT NAME = "b"
ELEMENT TYPE
FRAGMENT CONFIGURATION INFORMATION
POSITION INFORMATION
XPath ="/a[1]/b[2]/d[2]"
position="prevSibling"
REFERENCE INFORMATION
ID REFERENCE
ELEMENT NAME
ELEMENT TYPE
141
142
a
b
b

FIG. 15

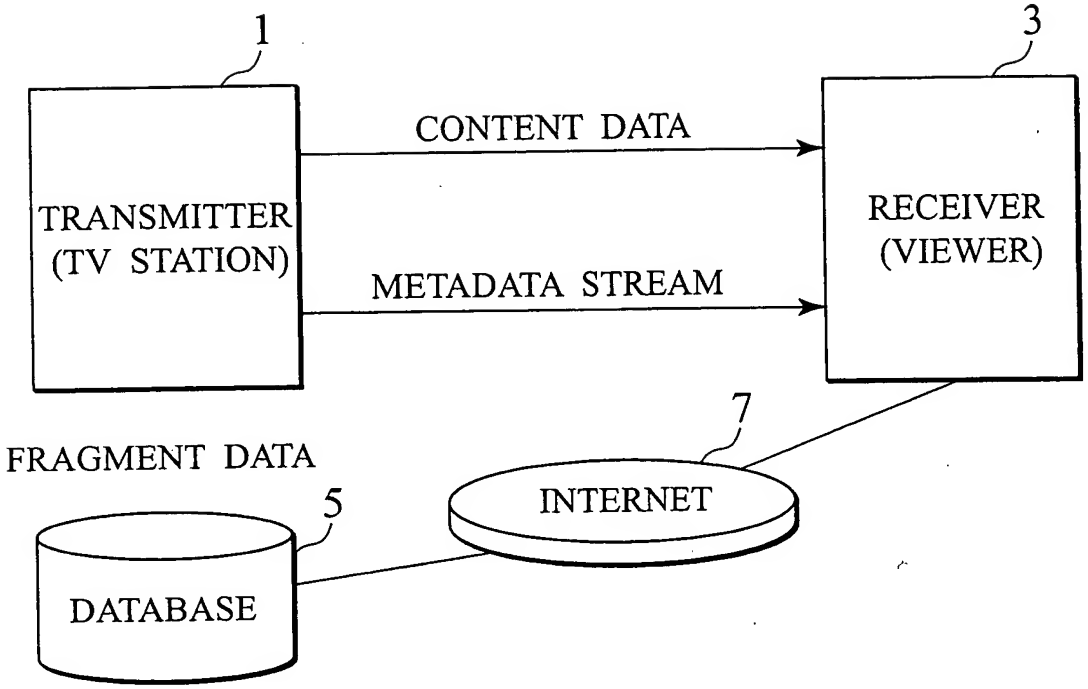

1
3
CONTENT DATA
TRANSMITTER
(TV STATION)
RECEIVER
(VIEWER)
METADATA STREAM
7
FRAGMENT DATA
INTERNET
5
DATABASE

FIG. 16

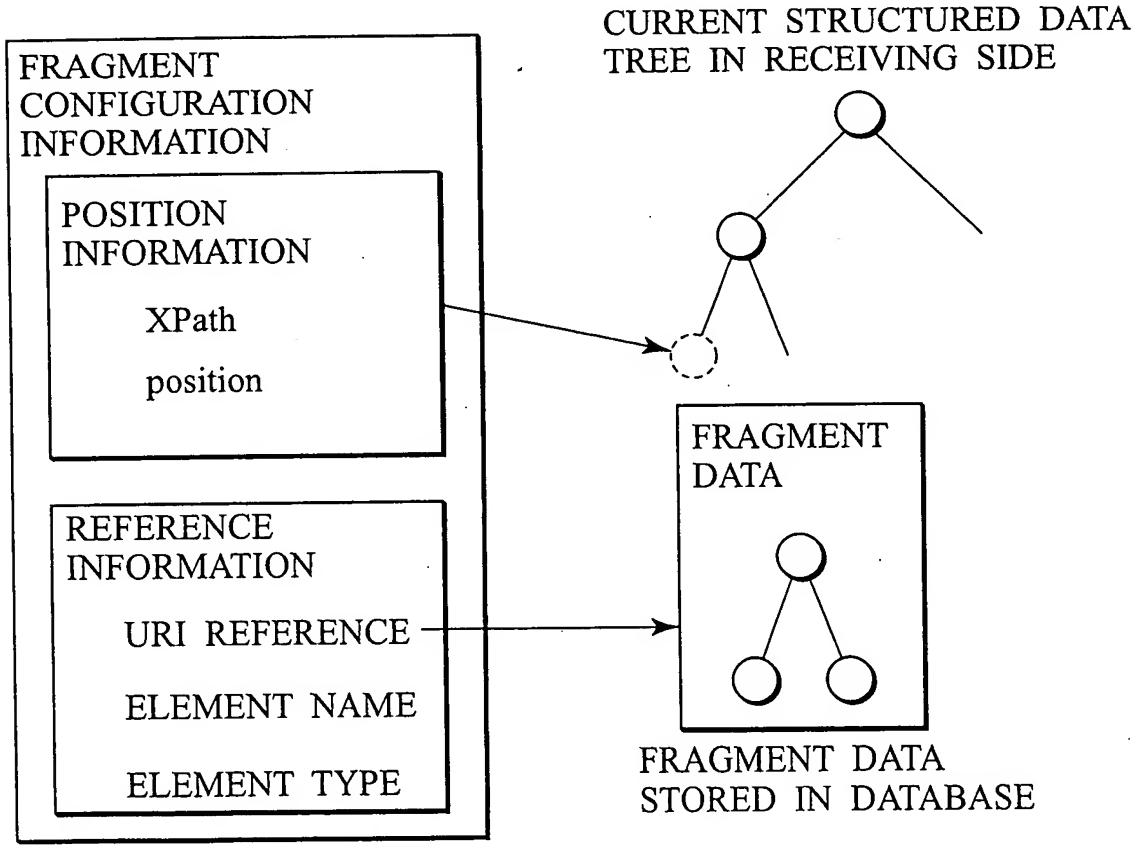

CURRENT STRUCTURED DATA
TREE IN RECEIVING SIDE
FRAGMENT
CONFIGURATION
INFORMATION
POSITION
INFORMATION
XPath
position
REFERENCE
INFORMATION
URI REFERENCE
ELEMENT NAME
ELEMENT TYPE
FRAGMENT
DATA
FRAGMENT DATA
STORED IN DATABASE

FIG. 17

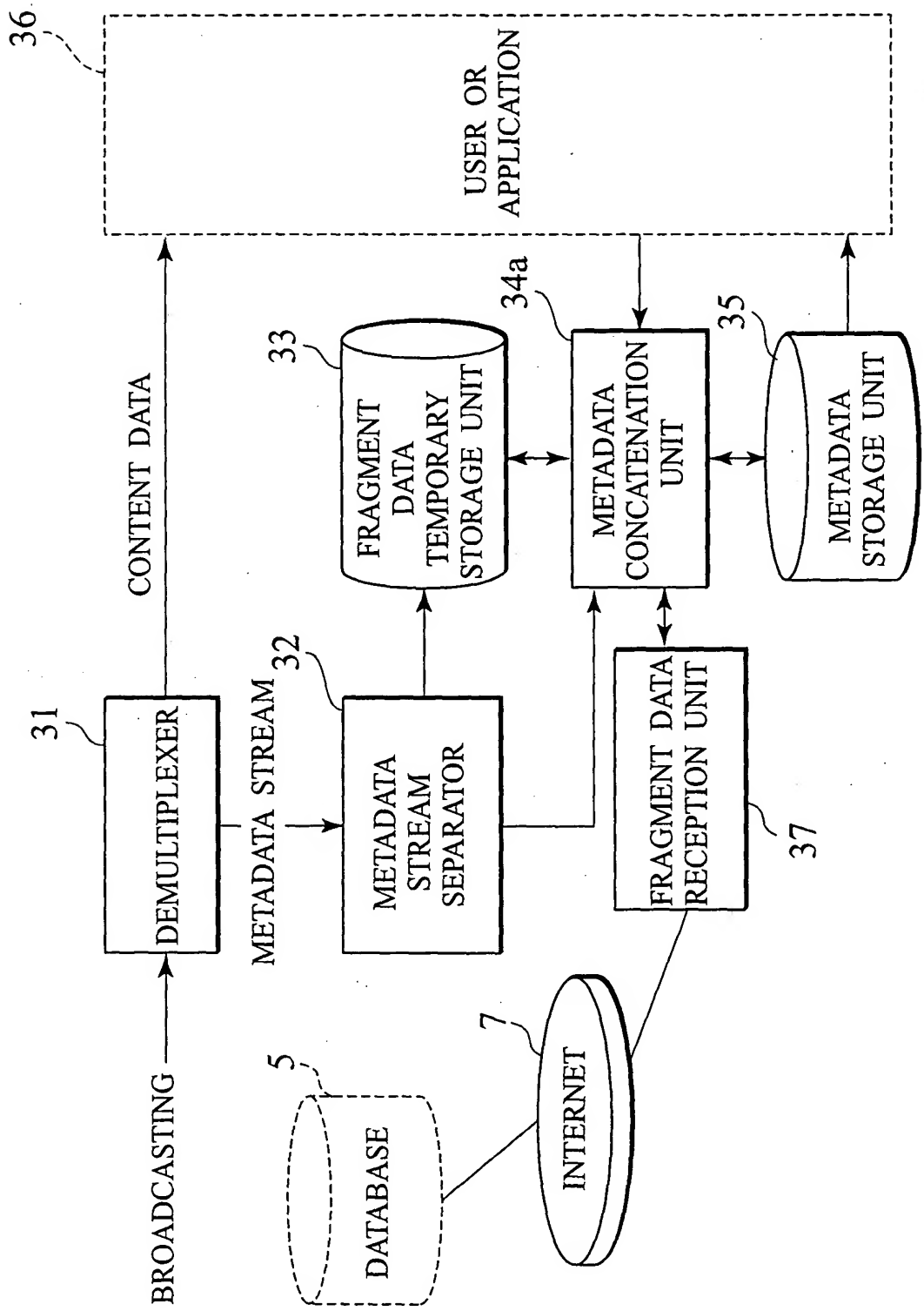

36
USER OR APPLICATION
CONTENT DATA
34a
35
33
FRAGMENT DATA TEMPORARY STORAGE UNIT
METADATA CONCATENATION UNIT
METADATA STORAGE UNIT
31
DEMULTIPLEXER
METADATA STREAM
32
METADATA STREAM SEPARATOR
FRAGMENT DATA RECEPTION UNIT
37
BROADCASTING
5
DATABASE
7
INTERNET

FIG. 18

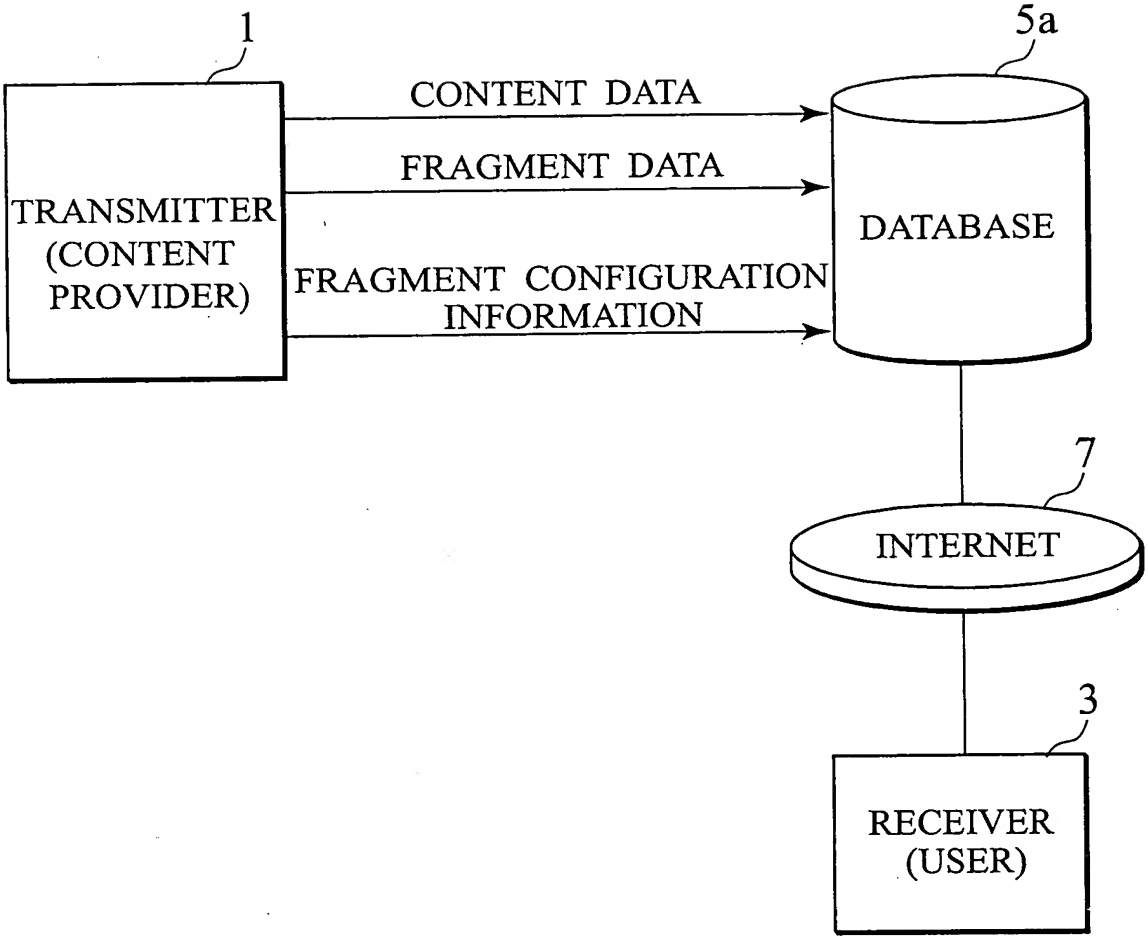

1
5a
CONTENT DATA
FRAGMENT DATA
FRAGMENT CONFIGURATION INFORMATION
TRANSMITTER (CONTENT PROVIDER)
DATABASE
7
INTERNET
3
RECEIVER (USER)

FIG. 19

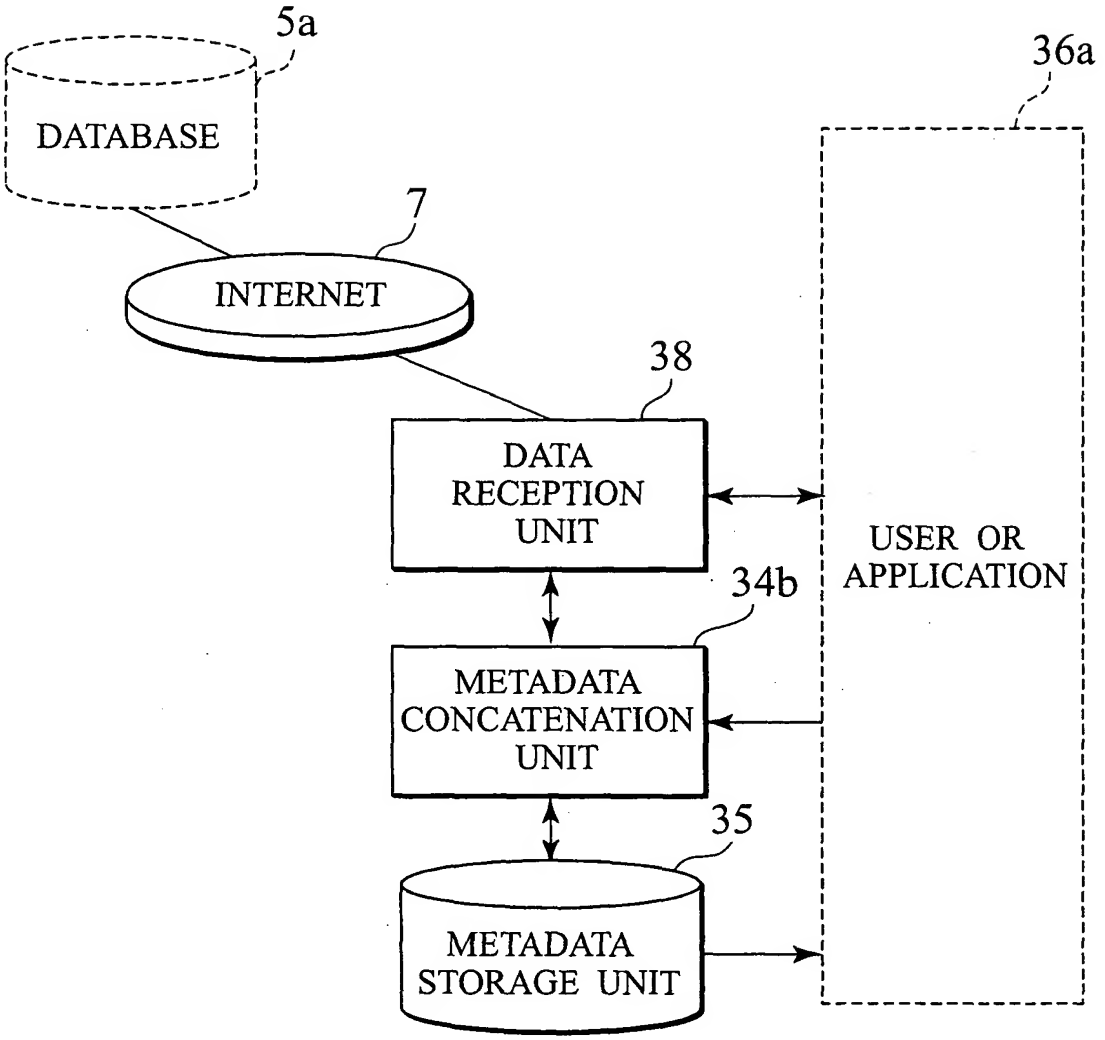


FIG. 20

	FRAGMENT CONFIGURATION INFORMATION	
FRAGMENT UPDATE COMMAND	FRAGMENT UPDATE CONTEXT (POSITION INFORMATION)	REFERENCE INFORMATION

FIG. 21

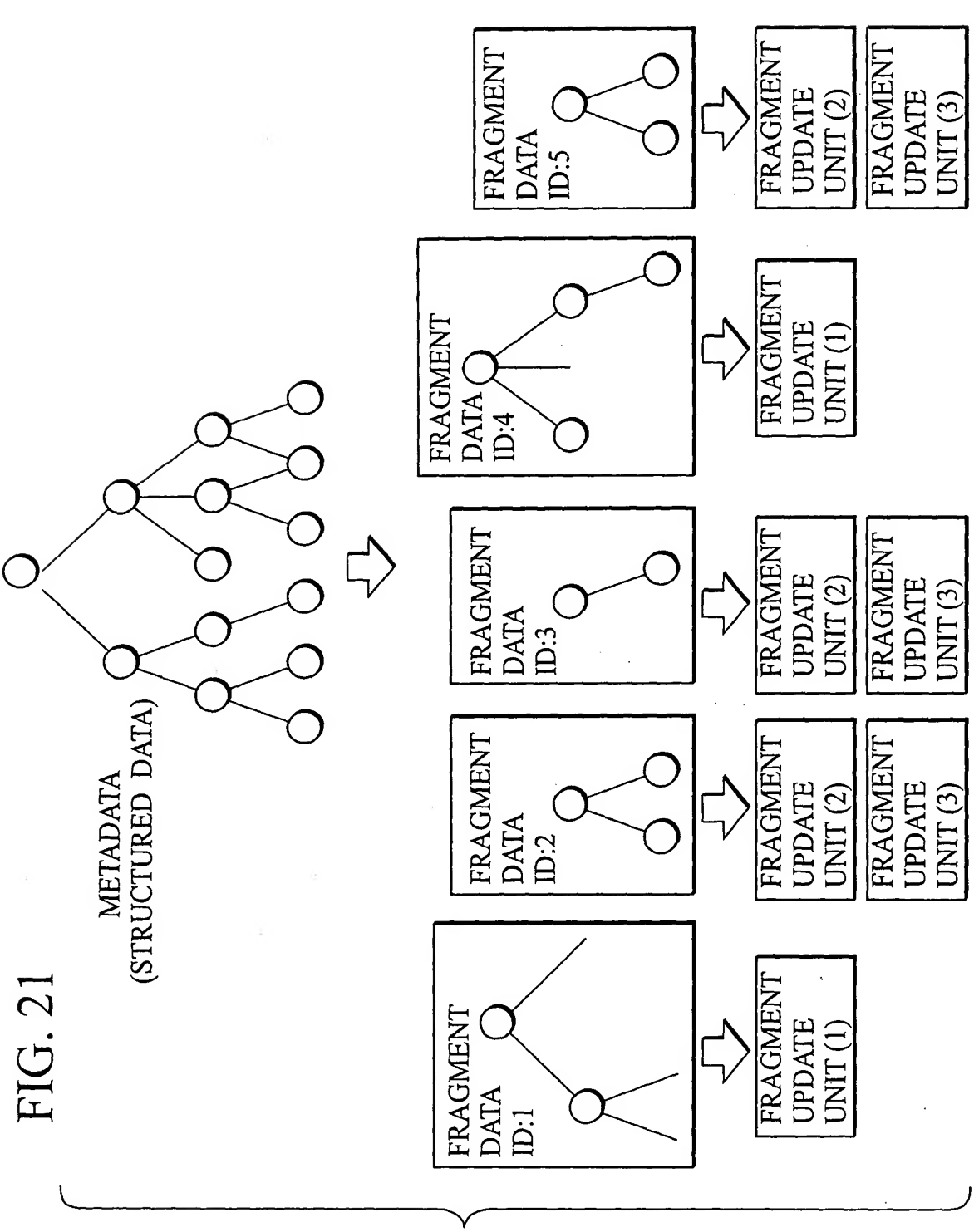

METADATA
(STRUCTURED DATA)
FRAGMENT DATA ID:1
FRAGMENT DATA ID:2
FRAGMENT DATA ID:3
FRAGMENT DATA ID:4
FRAGMENT DATA ID:5
FRAGMENT UPDATE UNIT (1)
FRAGMENT UPDATE UNIT (2)
FRAGMENT UPDATE UNIT (3)
FRAGMENT UPDATE UNIT (1)
FRAGMENT UPDATE UNIT (2)
FRAGMENT UPDATE UNIT (3)
FRAGMENT UPDATE UNIT (1)
FRAGMENT UPDATE UNIT (2)
FRAGMENT UPDATE UNIT (3)

FIG. 22

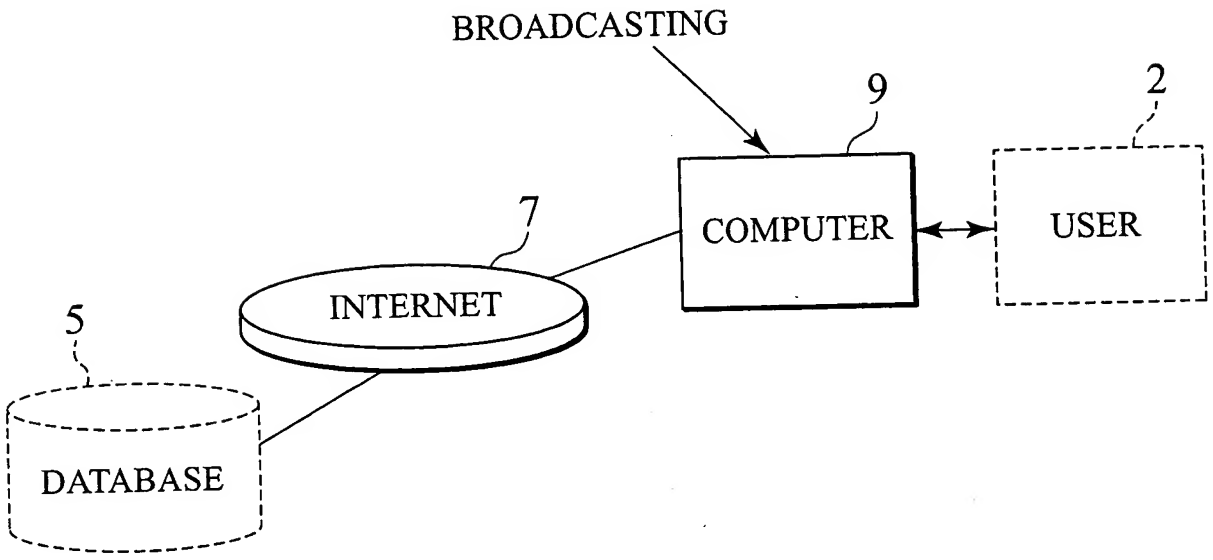

BROADCASTING
9
2
COMPUTER
USER
7
INTERNET
5
DATABASE

FIG. 23

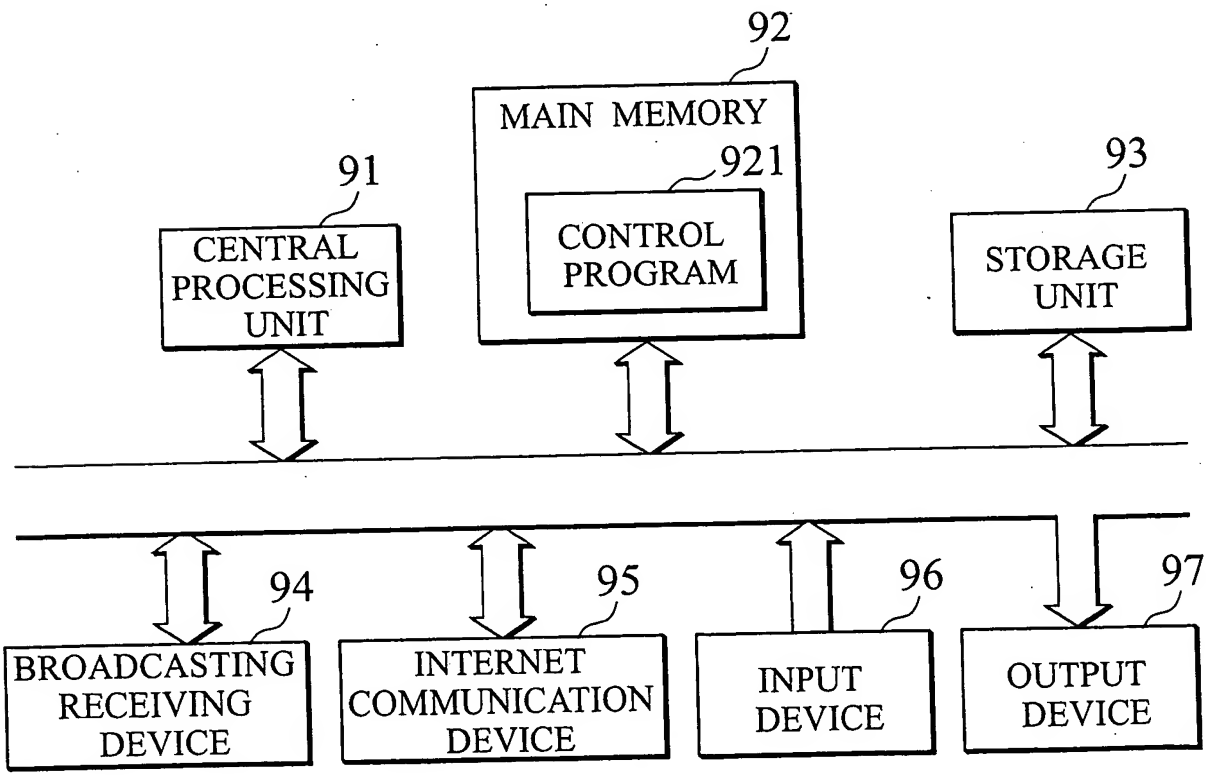

92
MAIN MEMORY
921
CONTROL PROGRAM
91
CENTRAL PROCESSING UNIT
93
STORAGE UNIT
94
BROADCASTING RECEIVING DEVICE
95
INTERNET COMMUNICATION DEVICE
96
INPUT DEVICE
97
OUTPUT DEVICE

FIG. 24

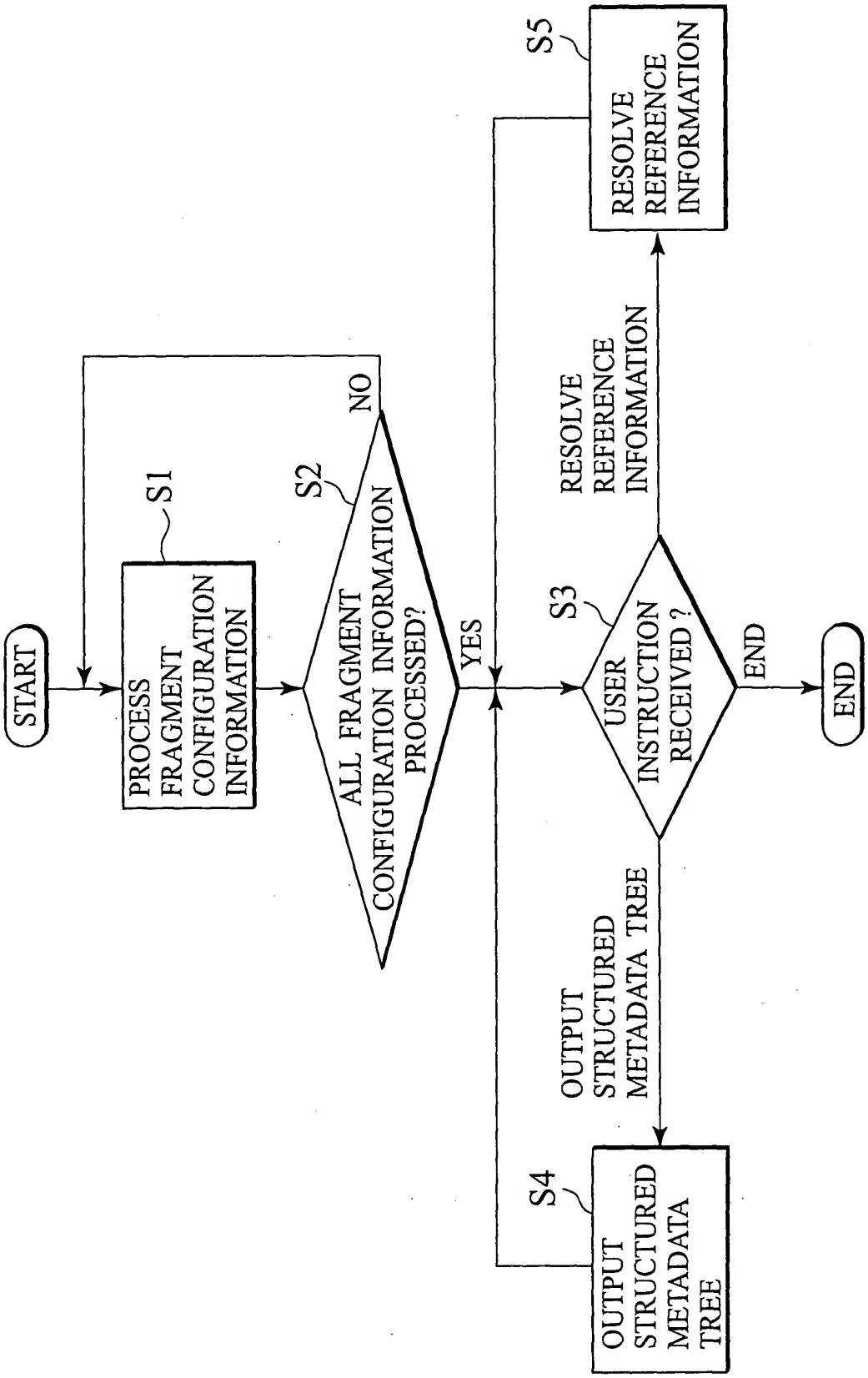

START
PROCESS FRAGMENT CONFIGURATION INFORMATION
S1
ALL FRAGMENT CONFIGURATION INFORMATION PROCESSED?
S2
NO
YES
USER INSTRUCTION RECEIVED ?
S3
END
RESOLVE REFERENCE INFORMATION
S5
RESOLVE REFERENCE INFORMATION
OUTPUT STRUCTURED METADATA TREE
S4
OUTPUT STRUCTURED METADATA TREE

FIG. 25

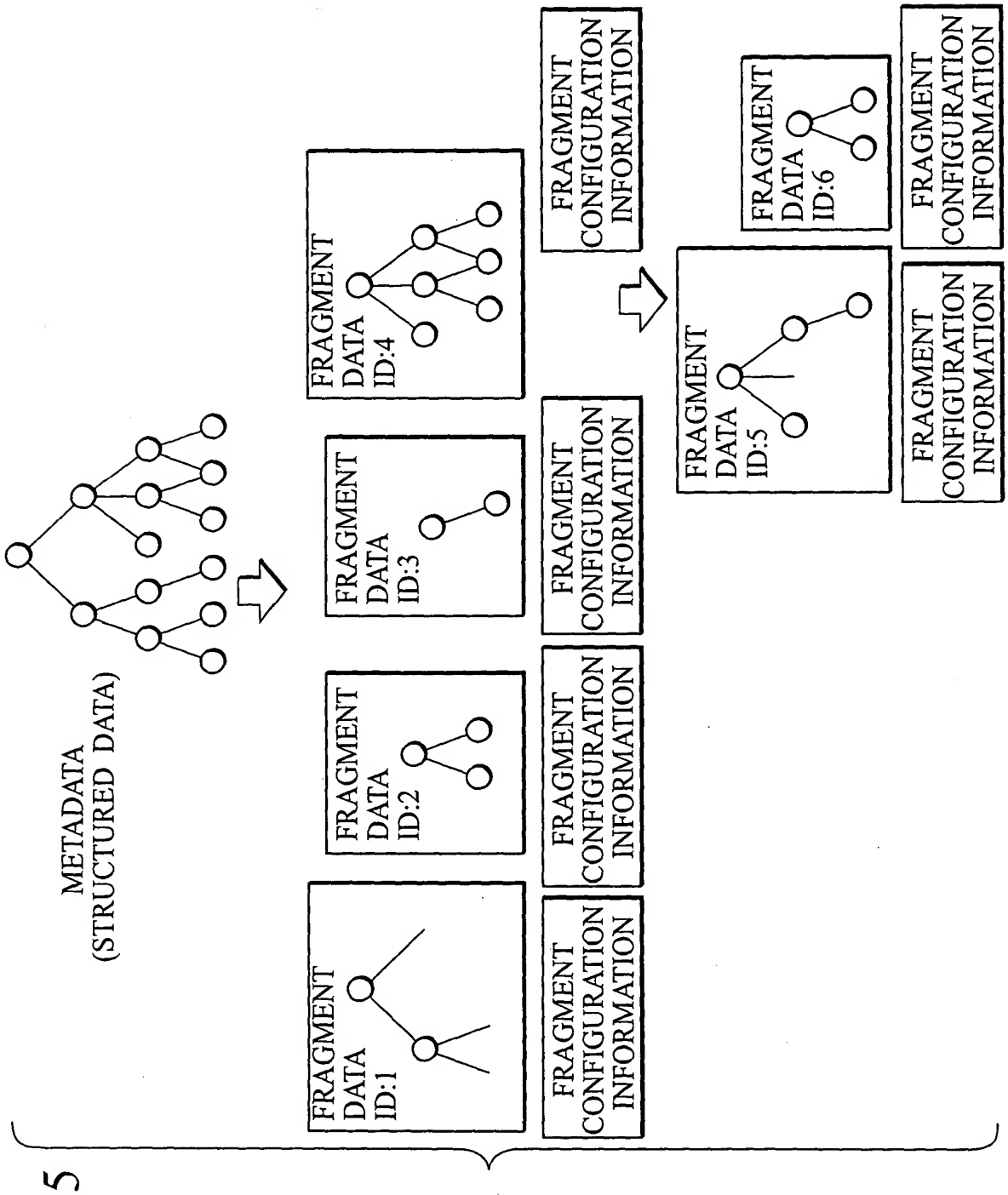
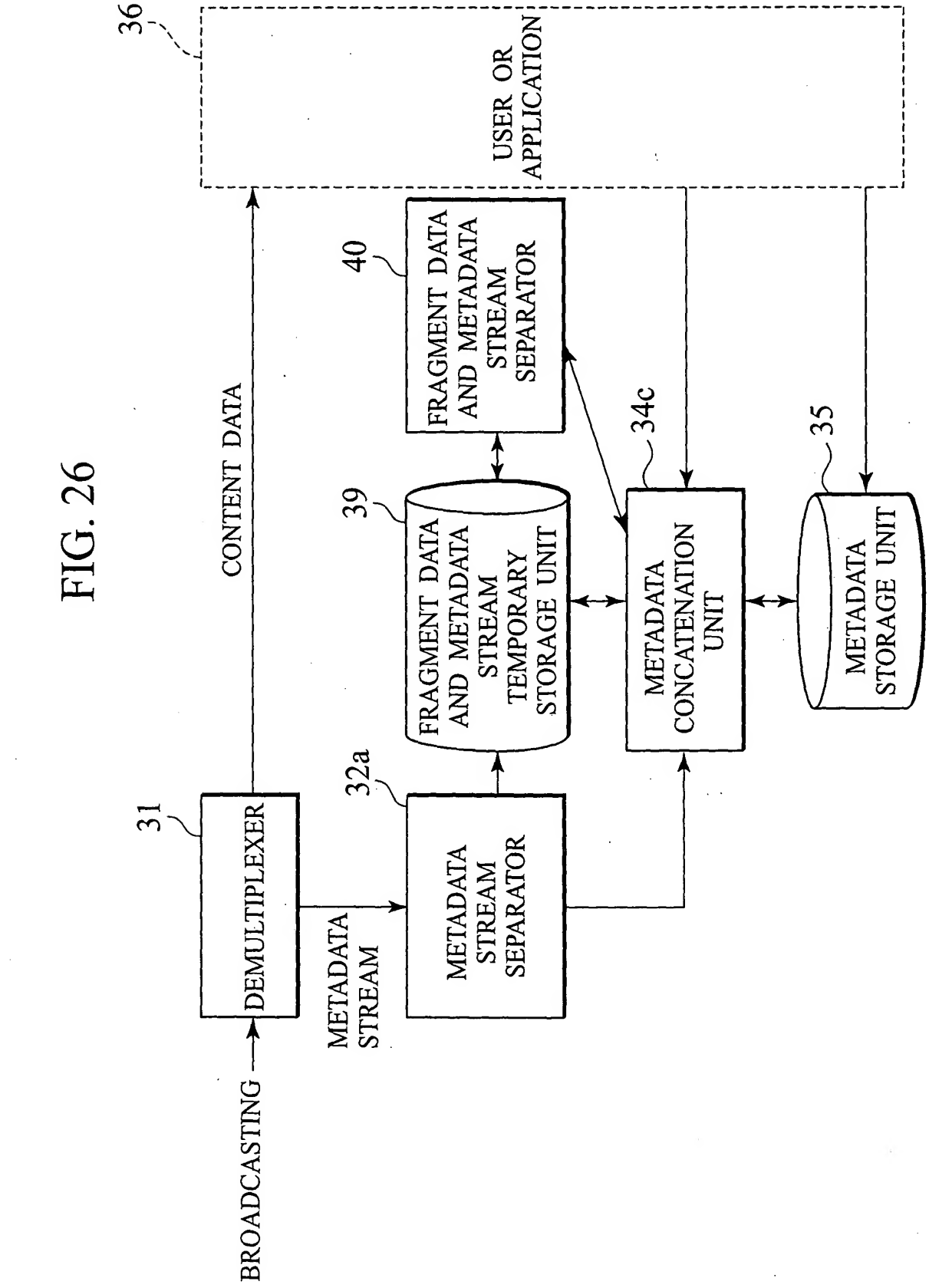

METADATA
(STRUCTURED DATA)
FRAGMENT DATA ID:1
FRAGMENT CONFIGURATION INFORMATION
FRAGMENT DATA ID:2
FRAGMENT CONFIGURATION INFORMATION
FRAGMENT DATA ID:3
FRAGMENT CONFIGURATION INFORMATION
FRAGMENT DATA ID:4
FRAGMENT CONFIGURATION INFORMATION
FRAGMENT DATA ID:5
FRAGMENT CONFIGURATION INFORMATION
FRAGMENT DATA ID:6
FRAGMENT CONFIGURATION INFORMATION

FIG. 26


36
USER OR APPLICATION
CONTENT DATA
40
FRAGMENT DATA AND METADATA STREAM SEPARATOR
39
FRAGMENT DATA AND METADATA STREAM TEMPORARY STORAGE UNIT
34c
METADATA CONCATENATION UNIT
35
METADATA STORAGE UNIT
31
DEMULTIPLEXER
32a
METADATA STREAM SEPARATOR
METADATA STREAM
BROADCASTING